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IMPLEMENTATION PLAN REVIEW FOR VIRGINIA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

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IMPLEMENTATION PLAN REVIEW FOR VIRGINIA AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

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16. ABSTRACT

Section IV of the Energy Supply and Environmental Coordination Act of 1974, (ESECA) requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interferring with the attainment and maintenance of the national ambient air quality standards. This document, which is also required by Section IV of ESECA, is EPA's report to the State indicating where regulations might be revised.

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IMPLEMENTATION PLAN REVIEW

FOR

VIRGINIA

AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

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February 1975

VIRGINIA

ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT
(SECTION IV - STATE IMPLEMENTATION PLAN REVIEW)

Table of Contents

		Page
1.0	EXECUTIVE SUMMARY	1
2.0	STATE IMPLEMENTATION PLAN REVIEW	7
2.1	Summary	7
2.2	Air Quality Setting - State of Virginia	12
2.3	Background on the Development of Virginia's Current State Implementation Plan	14
3.0	CURRENT ASSESSMENTS BASED ON STATE IMPLEMENTATION PLAN REVIEW	17
3.1	National Capital Interstate Air Quality Control Region	18
3.2	Eastern Tennessee - Southwestern Virginia Air Quality Control Region	19
3.3	Central Virginia Intrastate Air Quality Control Region	21
3.4	Hampton Roads Intrastate Air Quality Control Region	22
3.5	Northeastern Virginia Intrastate Air Quality Control Region	24
3.6	State Capital Intrastate Air Quality Control Region	25
3.7	Valley of Virginia Intrastate Air Quality Control Region	26
APPENDIX A - STATE IMPLEMENTATION PLAN BACKGROUND		29
APPENDIX B - REGIONAL SUMMARY		41
APPENDIX C - POWER PLANT SUMMARY		43
APPENDIX D - INDUSTRIAL, COMMERCIAL, INSTITUTIONAL SOURCE SUMMARY		47
APPENDIX E - AQCR FUEL USE SUMMARY		53

1.0 EXECUTIVE SUMMARY

The enclosed report is the U.S. Environmental Protection Agency's (EPA) response to Section IV of the Energy Supply and Environmental Coordination Act of 1974 (ESECA). Section IV required EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). In addition to requiring that EPA report to the State on whether control regulations might be revised, ESECA provides that EPA must approve or disapprove any revised regulations relating to fuel burning stationary sources within three months after they are submitted to EPA by the States. The States may, as in the Clean Air Act of 1970, initiate State Implementation Plan revisions; ESECA does not, however, require States to change any existing plan.

Congress has intended that this report provide the State with information on excessively restrictive control regulations. The intent of ESECA is that SIP's, wherever possible, be revised in the interest of conserving low sulfur fuels or converting sources which burn oil or natural gas to coal. EPA's objective in carrying out the SIP reviews, therefore, has been to try to establish if emissions from combustion sources may be increased. Where an indication can be found that emissions from certain fuel burning sources can be increased and still attain and maintain NAAQS, it may be plausible that fuel resource allocations can be altered for "clean fuel savings" in a manner consistent with both environmental and national energy needs.

In many respects, the ESECA SIP reviews parallel EPA's policy on clean fuels. The Clean Fuels Policy has consisted of reviewing implementation plans with regards to saving low sulfur fuels and, where the primary sulfur dioxide air quality standards were not exceeded, to encourage States to either defer compliance regulations or to revise the SO_2 emission regulations. The States have also been asked to discourage large scale shifts from coal to oil where this could be done without jeopardizing the attainment and maintenance of the NAAQS.

To date, EPA's fuels policy has addressed only those States with the largest clean fuels saving potential. Several of these States have or are currently in the process of revising SO_2 regulations. These States are generally in the Eastern half of the United States. ESECA, however, extends the analysis of potentially over-restrictive regulations to all 55 States and territories. In addition, the current reviews address the attainment and maintenance of all the National Ambient Air Quality Standards.

There are, in general, four predominant reasons for the existence of overly restrictive emission limitations within the State Implementation Plans. These are (1) the state's prerogative to surpass NAAQS; (2) the use of the example region approach in developing State-wide air quality control strategies; (3) the existence of the state air quality standards which are more stringent than NAAQS; and (4) the "hot spots" in only part of an Air Quality Control Region (AQCR) which have been used as the basis for controlling the entire region. Since each of these situations effect many State plans and in some instances conflict with current national energy concerns, a review of the State Implementation Plans is a logical follow-up to EPA's initial appraisal of the SIP's conducted in 1972. At that time SIP's were approved by EPA if they demonstrated the attainment of NAAQS or more stringent state air quality standards. Also, at that time an acceptable method for formulating control strategies was the use of an example region for demonstrating the attainment of the standards.

The example region concept permitted a State to identify the most polluted Air Quality Control Region (AQCR) and adopt control regulations which would be adequate to attain the NAAQS in that region. In using an example region, it was assumed that NAAQS would be attained in the other AQCR's of the State if the control regulations were applied to similar sources. The problem with the use of an example region is that it can result in controls which are more stringent than needed to attain NAAQS, especially in the utilization of clean fuels, for areas of the State where sources would not otherwise contribute to NAAQS violations. For instance, a control strategy based on a particular region or source can result in a regulation requiring 1 percent sulfur oil to be burned state-wide where the use of 3 percent sulfur coal would be adequate to attain NAAQS in some locations.

EPA anticipates that a number of States will use the review findings to assist them in making the decision whether or not to revise portions of their State Implementation Plans. However, it is most important for those States which desire to submit a revised plan to recognize the review's limitations. The findings of this report are by no means conclusive and are neither intended nor adequate to be the sole basis for SIP revisions; they do, however, represent EPA's best judgment and effort in complying with the ESECA requirements. The time and resources which EPA has had to prepare the reports has not permitted the consideration of growth, economics, and control strategy tradeoffs. Also, there has been only limited dispersion modeling data available by which to address individual point source emissions. Where the modeling data for specific sources were found, however, they were used in the analysis.

The data upon which the reports' findings are based are the most currently available to the Federal Government. However, EPA believes that the States possess the best information for developing revised plans. The States have the most up-to-date air quality and emissions data, a better feel for growth, and the fullest understanding for the complex problems facing them in the attainment and maintenance of air quality. Therefore, those States desiring to revise a plan are encouraged to verify and, in many instances, expand the modeling and monitoring data supporting EPA's findings. In developing a suitable plan, it is suggested that States select control strategies which place emissions for fuel combustion sources into perspective with all sources of emissions such as smelters or other industrial processes. States are encouraged to consider the overall impact which the potential relaxation of overly restrictive emissions regulations for combustion sources might have on their future control programs. This may include air quality maintenance, prevention of significant deterioration, increased TSP, NO_x, and HC emissions which occur in fuel switching, and other potential air pollution situations such as sulfates.

Although the enclosed analysis has attempted to address the attainment of all the NAAQS, most of the review has focused on total suspended particulate matter (TSP) and sulfur dioxide (SO_2) emissions. This is because stationary fuel combustion sources constitute the greatest source of SO_2 emissions and are a major source of TSP emissions.

Part of each State's review was organized to provide an analysis of the SO_2 and TSP emission tolerances within each of the various AQCR's. The regional emission tolerance estimate is, in many cases, EPA's only measure of the "over-cleaning" accomplished by a SIP. The tolerance assessments have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for changing emission limitation regulations. In conjunction with the regional analysis, a summary of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendices C, D, and E.

The State Implementation Plan for Virginia has been reviewed for the most prevalent causes of over-restrictive fuel combustion limiting regulations. The major findings of the review are:

FOR TOTAL SUSPENDED PARTICULATES THERE ARE NO INDICATIONS THAT EXISTING FUEL COMBUSTION SOURCE EMISSION LIMITING REGULATIONS ARE OVER-RESTRICTIVE.

FOR SULFUR DIOXIDE THERE ARE INDICATIONS THAT EMISSION LIMITS MAY BE RELAXED IN SOME AIR QUALITY CONTROL REGIONS WITHOUT EXCEEDING NATIONAL AMBIENT AIR QUALITY STANDARDS.

The supportive findings of the SIP review are as follows:

Like many other areas of the nation, high levels of total suspended particulates were found in Virginia. National Ambient Air Quality Standards were exceeded in each of the seven Air Quality Control Regions during 1973.

Air quality standards for sulfur dioxide were exceeded only in the Eastern Tennessee-Southwestern Virginia AQCR while ambient levels in the National Capital Interstate AQCR were close to the standards.

There is some potential for revising emission regulations for sulfur dioxide in the Hampton Roads Air Quality Control Region which has been found to be a good candidate for regulation relaxation.

Marginal candidates for revision of SO_2 emission regulations are the Northeastern Virginia and the Valley of Virginia Air Quality Control Regions.

2.0 STATE IMPLEMENTATION PLAN REVIEW

2.1 SUMMARY

A revision of fuel combustion source emissions regulations will depend on many factors.

- Does the State have air quality standards which are more stringent than NAAQS?
- Does the State have emission limitation regulations for control of (1) power plants, (2) industrial sources, (3) area sources?
- Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?
- Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?
- Are there no proposed Air Quality Maintenance Areas?
- Are there indications of a sufficient number of monitoring sites within a region?
- Is there an expected 1975 attainment date for NAAQS in the State Implementation Plan?
- Based on (1973) air quality data, are there no reported violations of NAAQS?
- Based on (1973) air quality data, are there indications of a tolerance for increasing emissions?
- Are the total emissions from stationary fuel combustion sources proportionally lower than those of other sources?
- Do modeling results for specific fuel combustion sources show a potential for a regulation revision?

The following portion of this report is directed at answering these questions. An AQCR's potential for revising regulations increases when there are affirmative responses to the above.

The initial part of the SIP review report, Section 2 and Appendix A, was organized to provide the background and current situation information for the State Implementation Plan. Section 3 and the remaining Appendices

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provide an AQCR analysis which helps establish the overall potential for revising regulations.

Based on an overall evaluation of EPA's current information, AQCR's have been rated as either a good, poor or marginal candidate for revising emission limiting regulations. These ratings which are shown in Table 2-1 were determined by assessing the following criteria:

Good	Poor	Marginal
1) Adequate number of air monitoring sites	1) Violation of NAAQS	1) No air quality data or insufficient number of monitoring sites
2) No NAAQS violations	2) Attainment date for NAAQS later than 1975	2) Inconsistent "indicators"
3) Attainment date of 1975 for NAAQS in the SIP	3) Proposed AQMA	
4) No proposed AQMAs	4) Modeling results show no potential for regulation revision	
5) Modeling results show a potential for regulation revision		

For an AQCR to be rated as a good candidate, all of the criteria listed under "Good" would have to be satisfied. The overriding factor in rating an AQCR as a poor candidate is a violation of either the primary or secondary National Ambient Air Quality Standards during 1973. However, if any of the other conditions listed under "Poor" exists, the AQCR would still receive that rating. The predominant reason for a marginal rating is a lack of sufficient air quality data. In Priority III regions, air monitoring was not required during 1973, therefore, there may be no data with which to determine the current air quality status. Marginal ratings are also given when there are varying or inconsistent "indicators".

After a candidacy has been given to a region, follow-up analysis should be conducted depending on the rating. A region that has been indicated to be a good candidate for regulation revision should be examined in more detail by the state and the Regional office of the EPA including an examination of current air quality, emissions, and fuel use data, with which the state has more familiarity. If the state feels that clean fuels could be saved in a

region rated marginal then an analysis of air quality data that may have become available since this report should be examined. If current data do not indicate a potential for regulation revision then further study would not be warranted. An AQCR that has been indicated to be a poor candidate would not warrant further study unless the state feels that new information has become available indicating that the poor rating is no longer valid.

TABLE 2-1

STATE IMPLEMENTATION PLAN REVIEW
(SUMMARY)

"Indicators"	State		National Capital AQCR 47		Eastern Tenn.-Southwestern Va. AQCR 207		Central Virginia AQCR 222		Hampton Roads AQCR 223		Northeastern Virginia AQCR 224		State Capital AQCR 225		Valley of Virginia AQCR 226	
	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2	TSP	SO_2
• Does the State have air quality standards which are more stringent than NAAQS?	No	No[a]														
• Does the State have emission limiting regulations for control of:																
1. Power plants	Yes	Yes														
2. Industrial sources	Yes	Yes														
3. Area sources	Yes	Yes														
• Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards?	Yes	No														
• Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?	Yes	Yes														
• Are there no proposed Air Quality Maintenance Areas?			No	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
• Are there indications of a sufficient number of monitoring sites within a region?			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
• Is there an expected 1975 attainment date for NAAQS in the State Implementation Plan?			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
• Based on (1973) Air Quality Data, are there no reported violations of NAAQS?			No	Yes	No	No[b]	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
• Based on (1973) Air Quality Data, are there indications of a tolerance for increasing emissions?			No	Yes	No	No	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
• Are the total emissions from stationary fuel combustion sources proportionally lower than those of other sources?			Yes	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes	No
• Do modeling results for specific fuel combustion sources show a potential for a regulation revision?			No	No	N.A.	N.A.	N.A.	N.A.	No	Yes	N.A.	N.A.	No	No	N.A.	N.A.
• Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations?			Poor	Poor	Poor	Poor	Poor	Marg.	Poor	Good	Poor	Marg.	Poor	Marg.	Poor	Marg.

[a] The State has adopted secondary standards for SO_2

[b] One station in Tennessee exceeded standards.

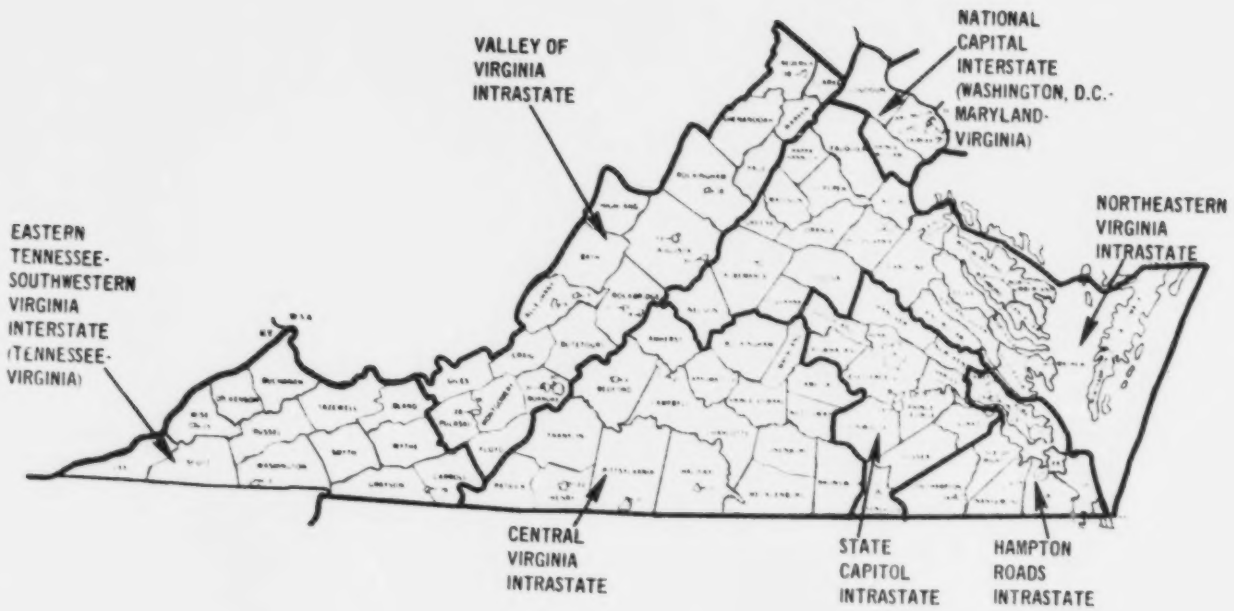

Figure 2-1 VIRGINIA AIR QUALITY CONTROL REGIONS

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2.2 AIR QUALITY SETTING - STATE OF VIRGINIA

2.2.1 Virginia Air Pollution Control Areas

The State of Virginia has been divided into seven Air Quality Control Regions (AQCR) as follows:

National Capital Interstate (District of Columbia, Maryland)
Eastern Tennessee-Southwestern Virginia Interstate (Tennessee)
Central Virginia Intrastate
Hampton Roads Intrastate
Northeastern Virginia Intrastate
State Capital Intrastate
Valley of Virginia Intrastate

These regions are also shown on Figure 2-1 and Table A-1, as well as the priority classifications for total suspended particulates and sulfur dioxide, an estimate of the 1975 population in each AQCR, and the counties and cities that have been proposed as Air Quality Maintenance Areas (AQMA). There are no AQMAs proposed for sulfur dioxide at this time.

2.2.2 Ambient Air Quality Standards

Virginia has adopted ambient air quality standards for suspended particulates and sulfur dioxide as shown on Table A-2. These standards duplicate the Federal standards except the State has also adopted secondary annual and 24-hour standards for sulfur dioxide, which are identical to the primary standard.

2.2.3 Virginia Air Quality Status

Air monitoring data for total suspended particulates and sulfur dioxide for 1973 are summarized in Tables A-4 and A-5 respectively. These data are from the SAROAD data bank as of July 1974. It should be noted that not all of the data collected by the state are necessarily in the data bank.

Ambient air concentrations of total suspended particulates exceeded standards in each of the seven Air Quality Control Regions during 1973. Six of the regions require a significant reduction in the 1973 levels to meet air quality standards (Table A-4), while one, the Northeastern Virginia AQCR requires a slight reduction. The highest annual geometric mean and the highest 24-hour value were recorded in the Central Virginia AQCR. All of the regions

are classified Priority I for particulates with the exception of the North-Eastern Virginia AQCR which is classified Priority IA. There appear to be a sufficient number of air monitors for suspended particulates in each of the regions.

Ambient levels of sulfur dioxide are not as serious as particulates which is encouraging from a clean fuels saving standpoint. The annual standard was not exceeded in any AQCR during 1973, as the maximum annual arithmetic average was 61 $\mu g/m^3$, recorded in the State Capital AQCR. The 24-hour standard was exceeded only in the Eastern Tennessee-Southwestern Virginia Interstate AQCR. In the National Capital Interstate AQCR, a 24-hour reading recorded in the District of Columbia was close to the Federal standard, while the Virginia portion of the AQCR was below the standards. Air quality data for 1973 indicate that except for the Eastern Tennessee-Southwestern Virginia AQCR, all of the regions have a tolerance for an increase in ambient levels while still maintaining standards. There is adequate sulfur dioxide monitoring in each of the regions although monitoring was not required in Priority III regions until two years after the approval of the State Implementation Plan.

2.2.4 Virginia Emissions Summary

A summary of particulate and sulfur dioxide emissions is presented in Table A-7 and A-8 respectively. These data are from the 1972 National Emissions Report, June 1974. This report utilizes information from the National Emissions Data System (NEDS) and has some deficiencies for the purpose of this report. Some of the information may be outdated, since the emissions inventory was conducted before many sources installed emission control equipment, and some sources have ceased operations since the inventory was completed.

Stationary source fuel combustion accounts for the majority of the particulate emissions in only three of the Air Quality Control Regions. These are the Eastern Tennessee-South ɔtern Virginia, the Hampton Roads, and the State Capital regions. Sulfur dioxide emissions from stationary fuel combustion, on the other hand, are higher than from any other source. In all but two regions, Central Virginia and the Valley of Virginia, electric power plants contribute the majority of sulfur dioxide emissions. Any relaxation of the

existing regulations for these sources may have a significant impact on air quality.

Table A-6 lists the number of power plants in each AQCR and the number of fuel combustion point sources within the state which together with the power plants contribute 90% or a significant amount of the particulate and sulfur dioxide emissions. This information was also taken from the NEDS inventory. The table also shows the percent of the total regional particulate and sulfur dioxide emissions that are due to Virginia fuel combustion sources.

2.3 BACKGROUND ON THE DEVELOPMENT OF VIRGINIA'S CURRENT STATE IMPLEMENTATION PLAN

2.3.1 Control Strategy for Particulate Matter and Sulfur Oxides

Particulate Matter. Virginia's control strategy as submitted on January 30, 1972, did not provide for attainment and maintenance of the primary and secondary standards for particulate matter in the State Capital Intrastate Region and the secondary standards for particulate matter in the Hampton Roads Intrastate Region and was recommended for disapproval. (Such disapproval was indicated in the May 31, 1972, Federal Register.)

Using the State Capital Region as an example region (except for the National Capital Interstate Region), the statewide emission limitations, as presented in the plan, were strategy-tested by IBM through the use of a proportional model, and the results were presented in the plan. This model predicted a maximum 1975 concentration of 60 $\mu g/m^3$ (annual geometric mean). Major errors, however, were found by the EPA plan manager. After corrections were made, the control strategy was retested. The resulting proportional model prediction at the maximum site was 88 $\mu g/m^3$ after application of the Virginia emission limitations and 77 $\mu g/m^3$ after application of reasonably available control technology. This demonstrated that the State's emission limitations as adopted January 17, 1972, were inadequate and did not show achievement of the primary standard by 1975. Since the EPA revised the emission inventory and observed that data were not available for all sources, the State will be required to update and complete an emission inventory. Since it was shown that the primary standards for particulate matter could be attained

through application of emission limitations that require reasonably available control technology, it was recommended that the Administrator propose such limitations and provide an 18-month extension for submission of the plan to attain and maintain secondary standards in this Region.

In the Hampton Roads Intrastate Region, EPA's calculations showed a maximum of 64 $\mu g/m^3$, after application of the Virginia emission limitations, and 59 $\mu g/m^3$, after application of reasonably available control technology. Since the secondary standards for particulate matter could be met through application of emission limitations requiring reasonably available control technology, it was recommended that the Administrator propose such limitations for the secondary standards and that Virginia's limitations be approved for primary standards.

In the Eastern Tennessee-Southwestern Virginia Interstate Region ambient air quality data did not indicate a need for emission reductions in Virginia's portion of the Region.

On May 4, 1972, Virginia submitted a revised particulate matter emission inventory for the State Capital, Hampton Roads, Central and Northeastern Intrastate Regions. Based on the revised emission inventory and calculations performed for the Central and Northeastern Intrastate Regions, it was shown that the national standards could be obtained by 1975 through application of the Virginia emission limitations as adopted on January 17, 1972. In the State Capital Region the adopted Virginia emission limitations were inadequate to achieve the national standard by 1975 and reasonably available control technology for fuel combustion sources and incinerators was recommended by EPA for promulgation to attain the primary standards; however, the secondary standard could not be attained and an 18 month extension was recommended. In the Hampton Roads Region EPA's recommended emission limitations would attain the primary and secondary standards by 1975. The State adopted statewide reasonably available control technology for fuel combustion sources and incinerators on June 12, 1972, thereby meeting the requirements of 40CFR51.13.

Sulfur oxides. Virginia's ambient air quality data (1971) did not indicate a need for emissions reductions for sulfur oxides in any Region other than the National Capital Interstate (discussed in the next paragraph).

Virginia's regulations pertinent to existing sources of this pollutant, and the State's regulatory control of construction and modification of sources provide adequate methods for insuring that ambient concentrations of sulfur oxides remain below the national secondary standards.

A separate strategy for particulate matter and sulfur oxides for Virginia's portion of the National Capital Interstate Region was submitted on April 20, 1970. The EPA diffusion model predicted concentrations below the secondary standard for particulate matter and sulfur oxides in the Virginia portion of the Region. The Administrator approved Virginia's control strategy in an August 4, 1971, letter to the Governor of Virginia and this approval was finalized in the Federal Register on February 3, 1972, Vol. 37, No. 23.

EPA and the State will continue to monitor the air quality readings in the National Capital Interstate Region to determine the accuracy of the diffusion model predictions.

3.0 CURRENT ASSESSMENTS BASED ON STATE IMPLEMENTATION PLAN REVIEW

The purpose of this section is to evaluate the available information for the State of Virginia and determine the feasibility of revisions to the SIP which would result in clean fuel conservation. The assessments will be made by AQCR addressing each type of fuel combustion source: power plants, large industrial and commercial/institutional sources, and area sources. The assessments must be made for each pollutant separately and are made on the basis of seven criteria: (1) 1973 air quality violations; (2) expected NAAQS attainment dates; (3) proposed Air Quality Maintenance Area (AQMA) designations; (4) total emissions; (5) portion of emissions from Virginia fuel combustion sources; (6) regional tolerance for emissions increase; and (7) pollutant priority classifications. Tables B-1 and B-2 tabulate these criteria for each AQCR for TSP and SO_2, respectively.

Table C-1 shows the 1973 fuel use and sulfur content of the fuel for each power plant. The sulfur content is an average content for the year, as variations of up to 20% are common. This information is from the Federal Power Commission and was used in place of the NEDS data since it is more current. Also shown in this table is the projected fuel use for 1975 for each plant, and the sulfur content of the fuel as required by the State Implementation Plan. Table C-2 is a summary of modeling results for power plants in three AQCRs.[1] Although it is realized that there are some limitations to results obtained by modeling, it is presented in this report as another indicator in assessing the candidacy of a region to revise emission regulations.

Appendix D shows the fuel use and emissions data for the major fuel combustion sources in each of the AQCRs that were listed in the NEDS inventory as being the major emitters of particulates and sulfur dioxide. Appendix E shows the total fuel use for each AQCR.

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[1] The modeling analysis of the power plants was performed by the Walden Research Division of Abcor, Inc. A single-source and valley model, developed by the Meteorology Laboratory, EPA, was used. The model employs a Gaussian plume model and Briggs plume rise equation. Comments on the use of the model are included in Appendix C.

3.1 NATIONAL CAPITAL INTERSTATE AIR QUALITY CONTROL REGION

3.1.1 Regional Assessment

Ambient air levels of total suspended particulates during 1973 exceeded both the annual and 24-hour secondary standards in the Virginia portion of this Air Quality Control Region as shown in Table A-4. This is a Priority I region for particulates and has several counties and cities that comprise a proposed Air Quality Maintenance Area for this pollutant.

Sulfur dioxide levels during 1973 did not exceed either the annual or 24-hour standard (Table A-5). Although the data indicate a tolerance for an increase in SO_2 emissions, relaxation of the emission limits is not recommended since SO_2 levels in the District of Columbia portion of the AQCR were close to the 24-hour standard. This is a Priority I region for this pollutant and has no proposed AQMA's in Virginia, however, the District of Columbia has been proposed as an AQMA.

3.1.2 Power Plant Assessment

There are two power plants which contribute 11% of the particulate emissions and 86% of the sulfur dioxide emissions in the Virginia portion of the AQCR. Both of these plants require a reduction in the fuel sulfur content during 1973 in order to comply with SIP requirements (Table C-1). The Potomac River plant in the City of Alexandria burned low sulfur coal during 1973 (0.84%) and during the first quarter of 1974 (0.92%), however 0.69% sulfur content fuel is required. Although a clean fuel saving potential exists based on the fuel sulfur content, sulfur dioxide levels in this region as previously mentioned were close to the 24-hour standard which precludes a shift to higher sulfur coal.

The Possum Point plant in Prince William County has been burning high sulfur content fuel for several years. During 1973 the sulfur content of the oil used at this plant averaged 2.26%, and 2.2% during the first quarter of 1974. A reduction to 1.04% sulfur content is required by the SIP at this plant. There are five generating units at this plant, four of which are convertible to coal. This in itself represents a potential saving of significant amount of oil, however ambient air levels of suspended particulates and sulfur

dioxide in this region again precludes a fuel switch. Table C-2 shows the results of modeling analysis for this plant and indicates that the emissions from this plant alone are sufficient to cause violations of the 24-hour SO_2 standard under certain conditions. Suspended particulate levels would also be adversely affected as indicated in the table. It is not recommended that emission limiting regulations for either of these plants be relaxed because of the existing air quality status.

3.1.3 Industrial, Commercial, Institutional Source Assessment

Major fuel combustion point sources contribute 7% of the particulate emissions and 4% of the sulfur dioxide emissions in the Virginia portion of this AQCR. The major sources of these pollutants as listed in the NEDS inventory are shown in Table D-1. The fuels used by these sources consisted of a maximum of 1% sulfur content for coal and 0.95% for oil. These data are for the year of the NEDS emission inventory and may not be representative of the current fuel use. As with power plants, a switch to higher sulfur fuel or a switch from oil to coal is not feasible because of the air quality status in this region.

3.1.4 Area Source Assessment

Area source fuel combustion accounts for 7% of both the particulate and sulfur dioxide emissions in the Virginia portion of this AQCR. Fuel use by area sources is shown in Table E-1. It is usually impractical for small residential and commercial sources to switch from either gas or oil use to coal because of the costs involved in changing combustion equipment. The only fuel savings that can be normally achieved by these sources is a switch to a higher sulfur fuel content, however, that is not feasible in this region because of the existing sulfur dioxide levels.

3.1.5 Fuel Use Assessment

Fuel use by source category is shown in Appendix E.

3.2 EASTERN TENNESSEE-SOUTHWESTERN VIRGINIA INTERSTATE AIR QUALITY CONTROL REGION

3.2.1 Regional Assessment

Total suspended particulate levels during 1973 exceeded both the annual

and 24-hour secondary standards in this region. Although the highest and second highest 24-hour values were recorded in the Tennessee portion of this AQCR, the 24-hour secondary standard was violated in Virginia. This is a Priority I region for particulates and has no proposed Air Quality Maintenance Areas at this time for either particulates or sulfur dioxide. Ambient levels of sulfur dioxide exceeded the 24-hour standard at one monitoring site in Tennessee during 1973, while none of the stations in Virginia recorded violations. Based on the reading recorded in Tennessee, a significant reduction in ambient levels is needed to meet air quality standards in this region (Table A-5). This region is classified Priority I for sulfur dioxide and 1973 data indicate no potential for revising existing SO_2 emissions regulations. Current air quality data for SO_2 should be examined to determine if air quality standards are still being exceeded and if there is a tolerance for an increase in SO_2 emissions in the Virginia portion of the AQCR without jeopardizing the attainment of air quality standards.

3.2.2 Power Plant Assessment

There is one Virginia power plant in this region, the Clinch River plant in Russell County, which accounts for approximately 39% of the particulate emissions, and 63% of the sulfur dioxide emissions in the Virginia portion of the AQCR. During 1973, the average sulfur content of the fuel used at this plant was 0.71%, while during the first quarter of 1974 it was 0.66%. The SIP requires 1.58% sulfur at this plant, thereby affording a potential clean fuel saving. However, as previously mentioned, sulfur dioxide levels exceeded standards in this region and more detailed study is required.

3.2.3 Industrial, Commercial, Institutional Source Assessment

Major fuel combustion point sources contribute 20% of the particulate emissions and 17% of the sulfur dioxide emissions in the Virginia portion of the AQCR. The major sources of these pollutants as listed in the NEDS inventory are shown in Table D-1. These sources were burning relatively clean fuels, however, the quantity of fuel used is relatively low, thereby affording little potential for a clean fuel savings.

3.2.4 Area Source Assessment

Area source fuel combustion accounts for 4% of the particulate emissions and 15% of the sulfur dioxide emissions in the Virginia portion of this AQCR. Fuel use by area source category is shown in Table E-1.

3.2.5 Fuel Use Assessment

Fuel use by source category is shown in Appendix E.

3.3 CENTRAL VIRGINIA INTRASTATE AIR QUALITY CONTROL REGION

3.3.1 Regional Assessment

Ambient air levels of total suspended particulates exceeded the annual and 24-hour secondary standards in this region during 1973 (Table A-4). This region is classified Priority I for particulates and has one proposed Air Quality Maintenance Area. The annual primary standard was exceeded at four stations, while the primary 24-hour standard was exceeded at ten stations. There is virtually no potential for relaxing existing particulate emission regulations in this region.

Sulfur dioxide levels during 1973 did not exceed any standards in this region and air quality data indicate that there is a tolerance for an increase in ambient levels and still maintain standards. This region is classified Priority III for sulfur dioxide and has no proposed AQMAs for this pollutant.

3.3.2 Power Plant Assessment

There is one power plant in this region, the Brantly plant in Danville. There are no fuel use and emissions data in the NEDS inventory for this plant, however, the quantity of fuel used for 1972 is available as shown in Table 2-1.

3.3.3 Industrial, Commercial, Institutional Source Assessment

Point source fuel combustion in this region accounts for 17% of the particulate emissions and 63% of the sulfur dioxide emissions. There are several point sources in this region which are listed in Table D-1. The sulfur content of the coal used by these sources ranges from low to moderate

(0.63% - 1.56%), while the oil has a higher sulfur content (1.36% - 2.6%). Fuel use by these sources based on quantity and sulfur content affords little potential for significant fuel savings, should relaxation of emission regulations be considered.

3.3.4 Area Source Assessment

Area source fuel combustion accounts for 7% of the particulate emissions and 30% of the sulfur dioxide emissions in this region. Area sources account for less than 10% of the coal used in this region, but a substantial proportion of the oil and natural gas used. There is some potential in this region for saving clean fuels by increasing the sulfur content of the fuel oils used by the area sources, although the savings will not be considerable.

3.3.5 Fuel Use Assessment

Fuel use by source category is shown in Appendix E. Again, clean fuel savings in this region would be only moderate because of the quantity of fuel used.

3.4 HAMPTON ROADS INTRASTATE AIR QUALITY CONTROL REGION

3.4.1 Regional Assessment

During 1973, ambient levels of total suspended particulates exceeded both the annual and 24-hour standards. The annual secondary standard was exceeded at eight of the twenty-two sampling stations while the 24-hour standard was exceeded at nine of the stations (Table A-4). This region is classified Priority I for particulates and several cities have been proposed as Air Quality Maintenance Areas for this pollutant.

Sulfur dioxide standards were not exceeded in this region during 1973 and air quality data indicate that there is a tolerance for an increase in the ambient levels while still maintaining air quality standards (Table A-5). This region is classified Priority II for sulfur dioxide and has no proposed AQMAs for this pollutant. There is some potential for SO_2 emission regulation revision.

3.4.2 Power Plant Assessment

There are three power plants in this AQCR contributing 30% of the particulate emissions and 70% of the sulfur dioxide emissions. Two of these plants were multi-fuel users during 1973. The Reeves Avenue plant in Norfolk burned coal and oil, while the Yorktown plant in York County burned coal, oil, and gas (Table C-1). Both of these plants are projected to be using only oil in 1975. The average sulfur content of the oil used by these plants during 1973 was 0.21% - 1.0% affording a potential clean fuel savings as these plants have a projected fuel use in 1975 of approximately 14 million barrels. The savings can be achieved by using a higher sulfur content of oil, rather than a switch to coal which would increase the ambient particulate levels, which are already in violation of standards. Table C-2 shows the contribution to the ambient particulate and sulfur dioxide levels in the vicinity of the plants as a result of fuel switching. The Portsmouth plant in Chesapeake burned high sulfur oil in 1973 (2.3%) and also during the first quarter of 1974 (2.7%), which eliminates any clean fuel saving potential for this plant. This plant is presently in compliance with SIP requirements.

3.4.3 Industrial, Commercial, Institutional Source Assessment

Point source fuel combustion accounts for 9% of the particulate emissions and 16% of the sulfur dioxide emissions in this region. The major sources in this region, most of which are Federally owned, are shown in Table D-1. Most of these sources burned moderate to high sulfur content oil during the year that the emission inventory was completed and may not accurately reflect the current fuel use. The potential for clean fuel savings by these sources cannot be determined at this time.

3.4.4 Area Source Assessment

Area source fuel combustion accounts for 21% of the particulate emissions and 9% of the sulfur dioxide emissions in this region. A substantial amount of oil and natural gas is used by area sources in this region. There is little potential for savings of natural gas since it is usually impractical for these sources to switch to a different form of fuel.

3.4.5 Fuel Use Assessment

Fuel use by source category is shown in Appendix E.

3.5 NORTHEASTERN VIRGINIA INTRASTATE AIR QUALITY CONTROL RECION

3.5.1 Regional Assessment

Ambient air levels of total suspended particulates exceeded only the 24-hour secondary standard during 1973. Of the thirteen monitoring stations in this region, only two had sufficient data with which to calculate an annual geometric mean. (Table A-4). This region is classified Priority 1A for particulates and has one county proposed as an Air Quality Maintenance Areas.

Sulfur dioxide levels did not exceed the 24-hour standard during 1973, and there were insufficient data to determine an annual average. This is a Priority III region for sulfur dioxide, therefore, air monitoring was not required during 1973. There are no proposed AQMAs in this region for sulfur dioxide. There is a potential in this region for relaxing SO_2 emission limits based on air quality, however, there would be little benefit because of the low quantity of fuel use.

3.5.2 Power Plant Assessment

There is one power plant in this region, the Bremo Bluff plant in Fluvanna County. This plant burned 0.9% sulfur coal during 1973, and 1.65% is allowed in 1975 by the State Implementation Plan (Table C-1). Although there is a tolerance for an increase in the sulfur content of the fuel used, a relaxation of existing emission limits would be of little benefit since the quantity of fuel used by this plant is low.

3.5.3 Industrial, Commercial, Institutional Source Assessment

Point source fuel combustion accounts for 900 tons (1%) of the particulate emissions and 6,000 tons (30%) of the sulfur dioxide emissions in this region. The major sources in this region which are shown in Table D-1, have a low quantity of fuel use, and as previously mentioned a relaxation of the SO_2 emission regulations would do little to conserve clean fuel.

3.5.4 Area Source Assessment

Area source fuel combustion accounts for 2,800 (4%) tons per year of the particulate emissions and 4,000 tons (20%) of the sulfur dioxide emissions

in this region. Fuel use by area sources is shown in Table E-1.

3.5.5 Fuel Use Assessment

Fuel use by source category is shown in Appendix E.

3.6 STATE CAPITAL INTRASTATE AIR QUALITY CONTROL REGION

3.6.1 Regional Assessment

Ambient air levels of suspended particulates exceeded both the annual and 24-hour standards during 1973, in this region which is classified Priority I for this pollutant. There were 28 monitoring stations in this region during 1973 and the annual secondary standard was exceeded at eight stations, while the 24-hour secondary standard was exceeded at nine stations (Table A-4). There are several counties and cities that have been proposed as Air Quality Maintenance Areas for this pollutant.

Sulfur dioxide levels did not exceed either the annual or the 24-hour standards in this region during 1973. This region is classified Priority III for sulfur dioxide and there have not been any proposed AQMAs for this pollutant. Although there is a tolerance for an increase in SO_2 emissions based on 1973 air quality, there is not a substantial amount of clean fuel used in this region. A relaxation of current emission limits is not feasible as there would be little benefit derived from it.

3.6.2 Power Plant Assessment

Electricity generation accounts for 33% of the particulate emissions and 72% of the sulfur dioxide emissions in this region. There are two power plants operating in this region which are listed in Table C-1. The Chesterfield plant in Chesterfield County has been burning high sulfur oil for several years, burning 2.25% during 1973. This plant has six boilers, four of which are convertible to coal burning. A substantial amount of oil is consumed at this plant representing a potential saving of this fuel if a switch to coal is comtemplated. Table C-2 indicates the contribution to the ambient levels of particulates and sulfur dioxide if two or all four of the units were to switch to coal. As indicated this plant would contribute significantly to existing SO_2 levels and under certain conditions, the emissions from this

plant alone would cause SO_2 levels in the region to exceed air quality standards.

The Twelth Street plant in Richmond burned low sulfur coal and oil during 1973, however, the quantity of fuel used at this plant is so low that a significant fuel saving cannot be achieved.

3.6.3 Industrial, Commercial, Institutional Source Assessment

Point source fuel combustion accounts for 19% of the particulate emissions and 20% of the sulfur dioxide emissions in this region. The major sources of these pollutants as listed in the NEDS inventory are shown in Table D-1. The majority of these sources burned oil, most of it having a high sulfur content (1.92% - 2.6%). The small amount of coal used by these sources had a moderate sulfur content (1.0% - 1.14%). There is little potential for clean fuel savings by these sources.

3.6.4 Area Source Assessment

Area source fuel combustion accounts for 11% of the particulate emissions and 7% of the sulfur dioxide emissions in this region. There is a significant amount of oil and natural gas used by area sources in this region as shown in Table E-1. However, as mentioned earlier in this report, there is little potential for saving natural gas by switching to a different fuel because of the increased costs in changing fuel burning equipment.

3.6.5 Fuel Use Assessment

Fuel use by source category is shown in Appendix E.

3.7 VALLEY OF VIRGINIA INTRASTATE AIR QUALITY CONTROL REGION

3.7.1 Regional Assessment

Total suspended particulate levels exceeded the annual and 24-hour standards in this region during 1973. This region is classified Priority I for particulates and has three counties and one city proposed as Air Quality Maintenance Areas. Of the 41 monitoring stations in this region, 5 stations exceeded the annual secondary standard, and 11 stations exceeded the 24-hour secondary standard.

Sulfur dioxide levels did not exceed any standards during 1973 in this region which has a Priority III classification for this pollutant. There are no proposed AQMAs for sulfur dioxide. There is a tolerance for an increase in SO_2 emissions in this region while still maintaining air quality standards based on 1973 air quality data, however, the amount of clean fuels that would be saved is low as in some of the other regions.

3.7.2 Power Plant Assessment

There are two power plants in this region which account for 10% of the particulate emissions and 24% of the sulfur dioxide emissions. The Glen Lyn plant in Giles County burned 0.95% sulfur coal in 1973 and 0.87% during the first quarter of 1974. The SIP allows 1.58% sulfur at this plant, affording a potential clean fuel saving, although the saving is not substantial. The Riverton plant in Warren County is allowed 1.51% sulfur under SIP requirements which necessitates a significant decrease from the 3.73% sulfur coal used during 1973. During the first quarter of 1974, 1.3% sulfur was used at this plant. Fuel oil, containing 0.08% sulfur was used during 1973, and 0.15% in the first quarter of 1974 was also used at this plant.

3.7.3 Industrial, Commercial, Institutional Source Assessment

Point source fuel combustion accounts for 28% of the particulate emissions and 52% of the sulfur dioxide emissions in this region. The major sources as listed in the NEDS inventory are shown in Table D-1. The coal used by these sources at the time of the inventory was of a low to moderate sulfur content (0.64% - 1.3%), affording some potential savings, whereas the fuel oil used had a high sulfur content (1.94% - 2.5%).

3.7.4 Area Source Assessment

Area source fuel combustion accounts for 3% of the particulate emissions and 10% of the sulfur dioxide emissions in this region. Fuel use by area sources is shown in Table E-1. There is some potential for saving fuel oil in this region by these sources, by switching to a higher sulfur content. This finding is based on the fuel use data that are presently available for this report showing the fuel use at the time of the emission inventory and may not reflect the current situation.

3.7.5 Fuel Use Assessment

Fuel use by area sources are shown in Appendix E.

TABLE A-1. APPENDIX A STATE IMPLEMENTATION PLAN BACKGROUND
VIRGINIA AIR POLLUTION CONTROL AREAS

Air Quality Control Region	Federal Number	Priority Classification[a] TSP	SO_x	NO_x	Population 1975 (Millions)	AQMA Proposed[b] TSP Counties	SO_x Counties
National Capital Inter-State (D.C., MD.)	47	I	I	III	3.16	Arlington, Fairfax, Loudoun, Prince William, Alexandria City, Fairfax City, Falls Church City	None
Eastern Tennessee-Southwestern Virginia Interstate (Tenn.)	207	I	I	III	1.61	None	None
Central Virginia	222	I	III	III	0.59	Amherst, Appomattox, Campbell, Lynchburg City	None
Hampton Roads	223	I	II	III	1.13	James City, York, Hampton City, Newport News City, Williamsburg City, Chesapeake City, Portsmouth City, Suffolk City, Virginia Beach City	None
Northeastern Virginia	224	IA	III	III	0.42	Gloucester	None
State Capital	225	I	III	III	0.77	Charles City, Chesterfield, Goochland, Hanover, Henrico, Powhatan, Richmond City, Prince George, Dinwiddie, Petersburg City, Colonial Heights City, Hopewell City	None
Valley of Virginia	226	I	III	III	0.70	Botetourt, Craig, Roanoke, Roanoke City, Salem City	None

[a]Criteria Based on Maximum Measured (or Estimated) Pollution Concentration in Area

Priority	I	II	III
	Greater than ($\mu g/m^3$)	From - To ($\mu g/m^3$)	Less than ($\mu g/m^3$)
Sulfur oxide:			
Annual arithmetic mean	100	60-100	60
24-hour maximum	455	260-455	260
Particulate matter:			
Annual geometric mean	95	60-95	60
24-hour maximum	325	150-325	150

[b]Federal Register, July, 1974 counties showing potential for NAAQS violations due to growth.

TABLE A-2

AMBIENT AIR QUALITY STANDARDS

All Concentrations In $\mu g/m^3$

		Total Suspended Particulates		Sulfur Oxides			Nitrogen Oxides
		Annual	24-Hour	Annual	24-Hour	3-Hour	Annual
Federal	Primary	75(G)	260[a]	80(A)	365[a]	----	100
	Secondary	60(G)	150[a]	---	----	1300[a]	100
State	Primary	75(G)	260[a]	80(A)	365[a]	----	100
	Secondary	60(G)	150[a]	80(A)	365[a]	1300[a]	100

(G) Geometric Mean
(A) Arithmetic Mean
a Not to be exceeded more than once per year

TABLE A-3

AIR QUALITY STANDARDS ATTAINMENT DATES

Air Quality Control Region	Federal Number	Attainment Dates: Particulates Primary	Particulates Secondary	Sulfur Dioxide Primary	Sulfur Dioxide Secondary
National Capital (D.C., MD.)	47	6/75	6/75	6/72	6/72
Eastern Tennessee-Southwestern Virginia (Tenn.)	207	6/75	6/75	6/72	6/72
Central Virginia	222	6/75	6/75	a	a
Hampton Roads	223	6/75	6/75	6/72	6/72
Northeastern Virginia	224	6/75	6/75	a	a
State Capital	225	6/75	7/75	a	a
Valley of Virginia	226	6/75	6/75	a	a

a - Air Quality Levels Presently Below Standards

TABLE A-4

VIRGINIA AIR QUALITY STATUS (1973), TSP[a]

Name	AQCR #	# Stations Reporting	TSP Concentration ($\mu g/m^3$) Highest Reading Annual	Highest Reading 24-Hr	2nd Highest Reading 24-Hr	# Stations Exceeding Ambient Air Quality Standards: Primary Annual	Primary 24-Hr[c]	Secondary Annual	Secondary %	Secondary 24-Hr[c]	Secondary %	% Reduction Required to Meet Standards[d]	Standard on Which % Reduction Is Based
National Capital Interstate (D.C., MD.)	47[b]	64	77	668	351	1	3	7	11	7	11	+65	24-Hr.
Eastern Tennessee-Southwestern Virginia Interstate (Tenn.)	207[b]	42	93	528[e]	433[e]	2	2	4	10	8	19	+70	24-Hr.
Central Virginia	222	29	150	824	548	4	2	8	28	10	34	+77	24-Hr.
Hampton Roads	223	22	102	490	352	4	2	8	36	9	41	+63	24-Hr.
Northeastern Virginia	224	13	45[f]	187	157	0	0	0	0	1	8	+ 6	24-Hr.
State Capital	225	28	82	291	271	4	1	8	29	9	32	+50	24-Hr.
Valley of Virginia	226	41	95	636	550	2	4	5	12	11	27	+77	24-Hr.

[a] 1973 air quality in National Air Data Bank, July 28, 1974

[b] Interstate

[c] Violations based on more than one reading in excess of standard

[d] Formula:

$$\left(\frac{\text{2nd Highest 24 Hr - 24 Hr Secondary Standard}}{\text{2nd Highest 24-Hr - Background}}\right) \times 100, \left(\frac{\text{Annual - Annual Secondary Standard}}{\text{Annual - Background}}\right) \times 100$$

[e] Readings recorded in Tennessee portion of AQCR

[f] Only two stations had sufficient data to calculate annual average

Background Values: 40 $\mu g/m^3$ in National Capital AQCR, 30 $\mu g/m^3$ in all others

TABLE A-5

VIRGINIA AIR QUALITY STATUS (1973), SO_2[a]

Name	AQCR #	# Stations Reporting 24-Hr (Bubbler)	# Stations Reporting (Contin.)	SO_2 Concentration ($\mu g/m^3$) Highest Reading Annual	Highest Reading 24-Hr	2nd Highest Reading 24-Hr	# Stations Exceeding Ambient Air Quality Stds. Primary Annual	%	Primary 24-Hr[c]	%	Secondary 3-Hr	% Reduction[d] Required To Meet Standards	Standard on Which % Reduction Is Based
National Capital Interstate (D.C., MD.)	47[b]	26	12	34[e]	351[f]	322[f]	0	-	0	-	3	-13	24-Hr
Eastern Tennessee-Southwestern Virginia Interstate (Tenn.)	207[b]	22	4	13	809[g]	581[g]	0	-	1	5	0	+37	24-Hr
Central Virginia	222	8	0	8	60	34	0	-	0	-	-	-900	Annual
Hampton Roads	223	16	3	34	290	193	0	-	0	-	-	-89	24-Hr
Northeastern Virginia	224	5	0	--	52	49	0	-	0	-	-	-645	24-Hr
State Capital	225	16	2	61	500	196	0	-	0	-	-	-31	Annual
Valley of Virginia	226	10	0	15	172	103	0	-	0	-	-	-254	24-Hr

[a] 1973 air quality data in National Air Data Bank, July 28, 1974

[b] Interstate

[c] Violation based on 2nd highest reading at any station

[d] Formula: $\left(\frac{\text{2nd Highest 24-Hr - 24-Hr Standard}}{\text{2nd Highest 24-Hr}}\right) \times 100$, $\left(\frac{\text{Annual - Annual Standard}}{\text{Annual}}\right) \times 100$

[e] Reading recorded in Maryland portion of AQCR

[f] Reading Recorded in District of Columbia Portion of AQCR. Source: Annual Report on The Quality of the Air in Washington, D.C. 1973

[g] Reading recorded in Tennessee portion of AQCR

TABLE A-6

VIRGINIA FUEL COMBUSTION SOURCE SUMMARY

AQCR		Power Plants[a]	Other Fuel Combustion Point Sources		Area Sources[c]	Total Emissions[d] (10^3 tons/yr)		Emissions From Fuel Combustion Sources	
			TSP	SO_2		TSP	SO_2	TSP	SO_2
National Capital	47[b]	2	2	5	7[f]	85	262	7	27
East Tenn.-S.W. Va.	207[e]	1	2	4	13	276	422	22	9
Central Virginia	222	1[g]	7	8	17	88	27	28	03
Hampton Roads	223	3	3	6	29	22	108	6	45
Northeastern Virginia	224	1	1	3	24	48	20	27	100
State Capital	225	2	4	6	13	52	137	13	99
Valley of Virginia	226	2	9	9	12	17	87	11	36
	TOTAL	12	28	41	115	760	1062		

a - Virginia Power Plants Only

b - Virginia Plants, which along with power plants contribute 90% or a significant amount of the emissions within the state

c - Virginia counties

d - total for A

e - interstate

f - includes

g - no data available for this plant (formerly, Danville Water Gas and Electric)

TABLE A-7

VIRGINIA EMISSIONS SUMMARY,[a] TSP

AQCR			Total (10^3 tons/yr)	%	Electricity Generation (10^3 tons/yr)	%	Point Source Fuel Combustion (10^3 tons/yr)	%	Area Source Fuel Combustion (10^3 tons/yr)	%
National Capital	47	Va.	28	4	3	11	2	7	2	7
		Other	67	9	37	55	4	6	12	18
		Total	95	13	40	42	6	6	14	15
East Tenn.-S.W. Va	207	Va.	100	13	39	39	20	20	4	4
		Other	176	23	47	27	55	31	6	3
		Total	276	36	86	31	75	27	10	4
Central Virginia	222		88	11	0	0	15	17	6	7
Hampton Roads	223		22	3	6.6	30	1.9	9	4.6	21
Northeastern Virginia	224		65	8	13.8	21	0.9	1	2.8	4
State Capital	225		53	7	17.5	33	10.1	19	5.7	11
Valley of Virginia	226		170	22	16.8	10	47	28	5.7	3
		Total	769	100	180.7	23	155.9	20	48.8	6

[a]Emissions taken from 1972 National Emissions Report, June 1974

TABLE A-8

VIRGINIA EMISSIONS SUMMARY[a] SO_x

AQCR			Total (10^3 tons/yr)	%	Electricity Generation (10^3 tons/yr)	%	Point Source Fuel Combustion (10^3 tons/yr)	%	Area Source Fuel Combustion (10^3 tons/yr)	%
National Capital	47	Va.	74	7	64	86	3	4	5	7
		Other	188	18	136	72	9	5	39	21
		Total	262	25	200	76	12	5	44	17
East Tenn.-S.W. Va.	207	Va.	41	4	26	63	7	17	6	15
		Other	381	36	245	64	48	13	12	3
		Total	422	40	271	64	55	13	18	4
Central Virginia	222		27	2	0	0	17	63	8	30
Hampton Roads	223		105	10	73	70	17	16	9	9
Northeastern Virginia	224		20	2	10	50	6	30	4	20
State Capital	225		137	13	98	72	27	20	10	7
Valley of Virginia	226		89	8	21	24	46	52	9	10
		Total	1062	100	673	63	180	17	102	10

[a]Emissions taken from 1972 National Emissions Report, June 1974

TABLE A-9

VIRGINIA AQCR REQUIRED EMISSION REDUCTION[a]

AQCR		Required Particulate Emission Reduction		Required SO_2 Emission Reduction	
		%	10^3 tons/year	%	10^3 tons/year
National Capital	47[b]	+65	+ 62	-13	c
East Tenn. - S.W. Va.	207[b]	+70	+193	+37	+156
Central Virginia	222	+77	+ 68	-900	c
Hampton Roads	223	+63	+ 14	-89	c
Northeastern Virginia	224	+ 6	+ 4	-645	c
State Capital	225	+50	+ 27	-31	c
Valley of Virginia	226	+77	+131	-254	c

[a] Based on a proportional change of emissions to air quality (1973)

[b] Interstate

[c] Air quality data indicate tolerance for emissions increase.

TABLE A-10

SUMMARY OF VIRGINIA FUEL COMBUSTION EMISSION REGULATIONS

PARTICULATE MATTER

(1) For operations with total heat input less than 25 million BTU per hour;

Maximum Allowable Emissions = 0.4 pounds per million BTU input

(2) For operations with total heat input between 25 million BTU and 10 billion BTU per hour;

Maximum Allowable Emissions = $0.8425\ H^{-0.2314}$ pounds per million BTU input

H = total heat input in millions of BTU per hour

(3) For operations with total heat input in excess of 10 billion BTU per hour;

Maximum Allowable Emissions = 0.10 pounds per million BTU input

SULFUR DIOXIDE

Allowable Emissions in pounds/hour = 2.64K

K = total capacity rating of combustion installation in BTU x 10^6/hour

In those regions, districts, or locations where attainment of ambient air quality standards is required, the following emission performance may be required by the State Air Pollution Control Board.

(A) Allowable Emissions in pounds/hour = 1.58K

(B) Allowable Emissions in pounds/hour = 1.06K

SUMMARY OF FUEL COMBUSTION REGULATIONS IN
NATIONAL CAPITAL INTERSTATE AQCR (#47)

PARTICULATE MATTER

(1) For operations with total heat input less than .7 million BTU per hour;

Maximum Allowable Emissions = 0.3 pounds per million BTU input

(2) For operations with total heat input between .7 million and 10 billion BTU per hour;

Maximum Allowable Emissions = $0.8425\ H^{-0.2314}$

H = total heat input in millions of BTU per hour

(3) For operations with total heat input in excess of 10 billion BTU per hour regulations are applicable.

SULFUR DIOXIDE

Allowable Emissions in pounds/hour = 1.06K

K = Total capacity rating of combustion installation in BTU x 10^6/hour

If necessary to achieve and maintain ambient Air Quality Standards, the Board will require on or before 1975, emissions standards in accordance with or more restrictive than the following:

Allowable Emissions = 0.55K

APPENDIX B REGIONAL SUMMARY

TABLE B-1

CANDIDACY ASSESSMENT FOR RELAXATION OF PARTICULATE EMISSION REGULATIONS

AQCR		Air Quality		Particulate Emissions 10^3 tons/year	% Emissions From Va. Fuel Combustion Sources	Emission Reduction Required For NAAQS (10^3 tons/yr)	TSP Priority	AQMAs Proposed?
		Number of Stations	Number of Violations[a]					
National Capital	47[b]	64	14	95	7	+ 62	I	Yes
East Tenn.-S.W. Va.	207[b]	42	12	276	23	+193	I	No
Central Virginia	222	29	18	88	24	+ 68	I	Yes
Hampton Roads	223	22	17	22	60	+ 14	I	Yes
Northeastern Virginia	224	13	1	65	27	+ 4	IA	Yes
State Capital	225	28	17	53	63	+ 27	I	Yes
Valley of Virginia	226	41	16	170	41	+131	I	Yes

[a]Total number of stations exceeding both annual and 24-hour standard

[b]Interstate

TABLE B-2

CANDIDACY ASSESSMENT FOR RELAXATION OF SO_2 EMISSION REGULATIONS

AQCR		Air Quality Number of Stations	Air Quality Number of Violations[a]	SO_2 Emissions 10^3 tons/yr	% Emissions from Va. Fuel Combustion Sources	Emission Reduction Required For NAAQS (10^3 tons/yr)	SO_2 Priority	AQMAs Proposed?
National Capital	47[b]	38	0	262	27	c	I	No
East Tennessee-W. Va.	207[b]	26	1	422	9	+156	I	No
Central Virginia	222	8	0	27	93	c	III	No
Hampton Roads	223	19	0	105	95	- 93	II	No
Northeastern Virginia	224	5	0	20	100	c	III	No
Southwestern	225	18	0	137	99	- 42	III	No
Valley of Virginia	226	10	0	89	86	c	III	No

a - Total number of stations exceeding both annual and 24-hour standard

b - Interstate

c - Tolerance for emission increase based on air quality data.

TABLE C-1. APPENDIX C POWER PLANT SUMMARY

VIRGINIA POWER PLANT ASSESSMENT[a]

AIR QUALITY CONTROL REGION	PLANT	CAPACITY (MW) 1973 1975	FUEL USE, 1973 Type % Sulfur	Annual[b] Quantity	1974 Fuel % S[c]	% S SIP
NATIONAL CAPITAL	POTOMAC RIVER	515.0 515.0	Coal 0.84	795.0	0.92	0.69
	POSSUM POINT	490.98 1335.98	Oil 2.26	4915.99	2.24	1.04
EASTERN TENN. - SOUTHWESTERN VA.	CLINCH RIVER	712.5 712.5	Coal 0.71	2202.18	0.66	1.58
CENTRAL VIRGINIA	BRANTLY[d]	32.3	Coal Oil Gas	27.0 1.0 1831.0	---- ---- ----	----
HAMPTON ROADS	PORTSMOUTH	649.64 649.64	Oil 2.3	5508.99	2.7	2.7
	REEVES AVENUE	100.0 100.0	Coal 0.85 Oil 0.21	72.0 38.48	0.71 ----	1.77
	YORKTOWN	375.0 1220.0	Coal 1.62 Oil 1.0 Gas	465.0 1203.0 2632.64	1.1 1.0	1.7
NORTHEASTERN VIRGINIA	BREMO BLUFF	284.26 284.26	Coal 0.9	474.0	0.74	1.65
STATE CAPITAL	CHESTERFIELD	1484.44 1484.44	Oil 2.25	12851.97	2.28	1.68

TABLE C-1 (Continued)

AIR QUALITY CONTROL REGION	PLANT	CAPACITY (MW) 1973 1975	FUEL USE, 1973 Type & Sulfur	Annual[b] Quantity	1974 Fuel % S[c]	% S SIP
STATE CAPITAL (Cont.)	TWELFTH STREET	102.5 102.5	Coal 0.8 Oil 0.3	1.0 15.0	0.7 ----	1.77
VALLEY OF VIRGINIA	GLEN LYN	402.5 402.5	Coal 0.95	864.87	0.87	1.58
	RIVERTON	34.5 34.5	Coal 3.73 Oil 0.08	15.8 64.7	1.3 0.15	1.51

a - Data from Federal Power Commission.

b - Fuel quantities: Coal (10^3 tons), Oil (10^3 barrels), Gas (10^6 cubic feet).

c - Data are for first quarter 1974 only.

d - Data for 1972, Steam Electric Plant Factors, 1973 edition, National Coal Association.

TABLE C-2

SUMMARY OF POWER PLANT MODELING RESULTS[a]

AQCR		Plant	Maximum 24-Hour Concentration $\mu g/m^3$ SO_2 Nominal Load	SO_2 Maximum Load	Particulates Nominal Load	Particulates Maximum Load	Maximum Annual Concentration $\mu g/m^3$ SO_2	Particulates
National Capital	47	Possum Point						
		1972 Operations	511	416	11	9	40	1
		Fuel Switch	676	550	340	277	52	26
		Potomac River						
		1972 Operations	436	627	62	97	18	2
		Fuel Switch(b)	443	643	62	97	24	2
Hampton Roads	223	Yorktown						
		1972 Operations	68	75	8	7	4	<1
		Fuel Switch #1(c)	66	73	19	17	3	1
		Fuel Switch #2(c)	68	73	19	17	4	1
State Capital	225	12th Street						
		1972 Operations	6	5	2	1	<1	<1
		Chesterfield						
		1972 Operations	355	397	8	9	23	1
		Fuel Switch #1A(d)	406	440	54	61	27	4
		Fuel Switch #1B(e)	478	527	101	107	31	7

(a) Modeling Analysis of Power Plants For Fuel Conversion Group(III) Walden Research, Sept. 9, 1974

(b) This plant does not have a fuel switch case. However, the plants which interact with it do have a fuel switch case.

(c) In fuel switch #1, units switch from oil to coal.

(c) In fuel switch #2, units switch from oil and natural gas to coal.

(d) Two units switch to coal

(e) Four units switch to coal

ADDENDUM TO APPENDIX C

USE AND LIMITATIONS OF MODELING ANALYSIS DATA[a]

1. The data inputs for the modeling have been extracted from the appropriate FPC Form 67 and the most representative meteorological data available. However, to calculate the occurrence of the highest 24-hour concentration, assumptions as to the daily emission rate are necessary. The results of the modeling exercise provide a range of the most probable maximum concentration.

2. It should be recognized that time and data constraints are such that the model predictions are useful but not omniscient. There are no data available, in general, to "validate" the model. Therefore, all relevant data, including hard data on actual daily plant operations, should be obtained, reviewed, and evaluated. In this way, the modeling results can be used as a logical part of the entire decision-making framework, not as an arbitrary, dogmatic absolute "answer", divorced from the real situation involved. In some cases it will be necessary to adjust the model's predictions based upon more complete and detailed information on a particular plant's operations.

3. Results of these evaluations are not intended to be used in any legal actions, including both public hearing and court proceedings. The very nature of atmospheric dispersion modeling is such that results are not suitable to legally prove (or disprove) a particular modeling result. The assumptions and judgments necessarily involved in modeling tend to mitigate against proof in a legal sense.

4. The best use of the data is in negotiations with states or sources in trying to establish a rational course of action to be followed with reasonable assurance that the air quality impact will be as indicated by the model.

[a] Extracted from comments by the Monitoring and Data Analysis Division, OAQPS

APPENDIX D INDUSTRIAL, COMMERCIAL, INSTITUTIONAL SOURCE SUMMARY

TABLE D-1

INDUSTRIAL, COMMERCIAL, INSTITUTIONAL SOURCE ASSESSMENT[a]

AIR QUALITY CONTROL REGION	SOURCE	BOILER CAPACITY (10^6 BTU/HR)	FUEL TYPE	FUEL AMOUNT[b]	EMISSIONS (TONS/YR.) PART.	EMISSIONS (TONS/YR.) SO_2
NATIONAL CAPITAL	GSA HEATING PLANT	410	Coal 0.8% S 7.7% A	50	250	760
	QUANTICO MARINE	183 130	Coal 1% S 8% A	30	510	569
	NATIONAL AIRPORT	221	Oil 0.95% S	63.1	30	198
	FORT BELVOIR	92	Oil 0.75% S	45.5	22	112
	ARLINGTON HALL STATION	766	Oil 0.9% S	18.2	9	54
EASTERN TENNESSEE-SOUTHWESTERN VIRGINIA	U.S. GYPSUM	50	Coal 0.73% S 10.2% A	7.4	259	131
	WASHINGTON MILLS	29	Coal 0.9% S 4.1% A	7	42	120
	BRUNSWICK CORP.	84	Coal 1.12% S 21.6% A	4.9	31	103
	WONDERKNIT CORP.	20	Coal 0.88% S 8.8% A	6	132	100
CENTRAL VIRGINIA	DUPONT	175	Coal 1.4% S 9.6% A	70	1874	3500
		50	Oil 2.3% S	216.2		

AIR QUALITY CONTROL REGION	SOURCE	BOILER CAPACITY (10^6 BTU/HR)	FUEL TYPE	FUEL AMOUNT[b]	EMISSIONS (TONS/YR.) PART.	EMISSIONS (TONS/YR.) SO_2
CENTRAL VA. (Cont.)	MEAD CORP.	2 @ 262	Coal 1.56% S 9.9% A	0.094	3240	3100
			Oil 0.0% S	3.3		
			Black Liquor	1.3 (Solid)		
	OWENS-ILLINOIS	280	Coal 1.0% S 8.5% A	124	1160	2360
	DAN RIVER	581	Coal 1.2% S 7.1% A	48.5	789	1578
		200	Coal 0.75% S 6.4% A	32.8		
	BURLINGTON INDUSTRIES (MECKLENBURG CO.)	175	Coal 0.9% S 6.3% A	33.2	820	600
		50	Oil 1.36% S	7.14		
	BURLINGTON INDUSTRIES ([illegible]ELL CO.)	55	Coal 0.7% S 6% A	14	113	250
		91	Oil 2.6% S	7.38		
	RUBATEX CORP.	78	Oil 2.11% S	35.2	17	245
	LANE CO.	57	Coal 0.63% S 8% A	8.3	197	100

TABLE D-1 (Continued)

AIR QUALITY CONTROL REGION	SOURCE	BOILER CAPACITY (10^6 BTU/HR)	FUEL TYPE	FUEL AMOUNT[b]	EMISSIONS (TONS/YR.) PART.	EMISSIONS (TONS/YR.) SO_2
HAMPTON ROADS	U.S. NAVY PUBLIC WORKS CENTER	791 184	Oil 2.2% S	721	349	5250
	NORFOLK NAVAL SHIPYARD	900 40	Oil 1.67% S	721	44	3964
	DOW BADISCHE	298	Oil 2.33% S	309.5	149	2380
	NAVAL ANPHIBIAN BASE	300	Oil 2.0% S	190.5	37	1260
	FORT EUSTIS	2 @ 312	Coal 0.9% S 9.5% A	15.4	965	471
			Oil 1.85% S	34.1		
	NORFOLK SHIPBUILDING	71	Oil 2.1% S	35.7	17	247
NORTHEASTERN VA.	CHESAPEAKE CORP.	464 217 111	Oil 2.15% Wood	700 75	83 1150	2402 56
				Total	1239	2458
	UNIV. OF VIRGINIA	72 2 @ 50	Coal 1% S 5.4% A	10	35	190
	HOLLY FARMS	59	Oil 2.1% S	18429	9	128
STATE CAPITAL	DUPONT	714	Coal 1.14% S 9.9% A	36.1	562	9656
		586 46	Oil 2.38% S	1129		

AQCR REGION	SOURCE	BOILER CAPACITY (10^6 BTU/HR)	FUEL TYPE	FUEL AMOUNT[b]	EMISSIONS (TONS/YR.) PART.	EMISSIONS (TONS/YR.) SO_2
[illegible] (Cont.)	CONTINENTAL CAN	731	Oil 2.18% S	1021	563	7340
		277	Wood	190	1620	143
	HERCULES INC.	610	Oil 1.92% S	714	120	4590
	FIRESTONE	180	Oil 2.25% S	102	49	759
	SOUTHERN JOHNS-MANVILLE	182	Coal 1% S 6% A	23.6	1070	448
	FEDERAL PAPER BOARD	2 @ 95	Coal 1.7% S	32	76	517
[illegible] OF VA.	WESTVACO	768 725 516	Coal 1.3% S 10% A	452	1471	11150
	FMC VISCOSE	846 599	Coal 1.2% S 11% A	323	18286	9490
		276	Oil 2.5% S	259.5		
	CELANESE FIBERS	520 396 316 196	Coal 1.15% S 11% A	400	2961	8740
		153	Oil	19.8		
	DUPONT	2 @ 209 196 183 176	Coal 1.22% S 12.2% A	163.3	2717	7497
		2 @ 209 176	Oil 2.5% A	331		

TABLE D-1 (Continued)

AIR QUALITY CONTROL REGION	SOURCE	BOILER CAPACITY (10^6 BTU/HR)	FUEL TYPE	FUEL AMOUNT[b]	EMISSIONS (TONS/YR.) PART.	EMISSIONS (TONS/YR.) SO_2
VALLEY OF VA. (Cont.)	HERCULES, INC. (RADFORD ARSENAL)	1000	Coal 1.2% S 12% A	215	7760	5197
		150	Coal 0.7% S 12% A	22.3		
	MERCK	110	Coal 1.06% S 6.9% A	44.7	318	1026
		100	Oil 1.94% S	19.8		
	BURLINGTON IND.	163	Coal 0.7% S 7.6% A	24	365	319
	VA. POLYTECHNIC INSTITUTE	219	Coal 0.75% S 11% A	17	122	242
	REYNOLDS METALS	27	Coal 0.64% S 4.9% A	10.4	127	126

a - Fuel combustion sources which are significant emitters of particulates and sulfur dioxide. Sources are ranked in order of decreasing SO_2 emissions.

b - Fuel quantity: Coal is in 10^3 Tons/Year. Oil is in 10^3 Bbls/Year.

TABLE E-1. FUEL USE SUMMARY[a]

APPENDIX E AQCR FUEL USE SUMMARY

AIR QUALITY CONTROL REGION	COAL (10^3 TONS) ANTHRACITE	COAL (10^3 TONS) BITUMINOUS	OIL (10^3 BARRELS) RESIDUAL	OIL (10^3 BARRELS) DISTILLATE	GAS (10^6 CU. FT.) NATURAL	GAS (10^6 CU. FT.) PROCESS
NATIONAL CAPITAL						
Area Sources	0	81	8907	9386	108510	0
Point Sources	0.3	4196	12921	252	1562	0
Total	0.3	4277	21828	9638	110072	0
EASTERN TENN. - SOUTHWESTERN VA.						
Area Sources	0	381	327	3144	34460	160
Point Sources	0	11849	170	170	12579	7485
Total	0	12230	497	3314	47039	7645
CENTRAL VIRGINIA						
Area Sources	0	37	809	2532	16310	0
Point Sources	0	346	326	44	3285	0
Total	0	383	1135	2576	19595	0
HAMPTON ROADS						
Area Sources	0	31	843	4023	32400	0
Point Sources	0	908	7173	362	1872	0
Total	0	939	8016	4385	34272	0
NORTHEASTERN VIRGINIA						
Area Sources	0	10	325	1881	8290	0
Point Sources	0	537	743	26	0	0
Total	0	547	1068	1907	8290	0
STATE CAPITAL						
Area Sources	0	35	1033	3285	25030	0
Point Sources	0	113	15758	1866	1508	0
Total	0	148	16791	5151	26538	0
VALLEY OF VIRGINIA						
Area Sources	0	68	865	2684	21570	0
Point Sources	0	2801	864	111	4344	86
Total	0	2869	1729	2795	25914	86

a - Source: Stationary Source Fuel Summary Report NEDS. November 1974.